JUPITER ACADEMY

NEET UG - PHYSICS SAMPLE PAPER - 12 - 03

NEET-UG - Physics

Time Allowed: 1 hour **Maximum Marks: 200**

Section A

1. Two charged spherical conductors (each of radius R) are at a distance d apart (d > 2R). The charge on one is +q and that on the other is - q. The magnitude of the force between them will be: **[4]**

   a) less than $\frac{1}{4\pi\varepsilon_0}\frac{q^2}{d^2}$ b) more than $\frac{1}{4\pi\varepsilon_0}\frac{q^2}{d^2}$

   c) $\frac{1}{4\pi\varepsilon_0}\frac{q^2}{d^2}$ d) zero

2. The direction of electric field intensity (E) at a point on the equatorial line of an electric dipole of dipole moment $(\vec{P})$ is: **[4]**

   a) along the equatorial line away from the dipole b) along the equatorial line towards the dipole

   c) perpendicular to the equatorial line and parallel to $\vec{P}$ d) perpendicular to the equatorial line and opposite to $\vec{P}$

3. The electrostatic force between the metal plates of an isolated parallel plate capacitor C having a charge Q and area A, is: **[4]**

   a) inversely proportional to the distance between the plates b) proportional to the square root of the distance between the plates

   c) linearly proportional to the distance between the plates d) independent of the distance between the plates

4. Minimum number of $8\mu F$ and 250 V capacitors used to make a combination of $16\mu F$ and 1000 V are: **[4]**

   a) 4 b) 32

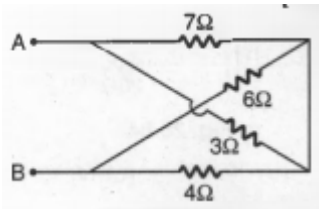
   c) 2 d) 8

5. Three capacitors of $2\mu F, 3\mu F$ and $6\mu F$, are joined in series and the combination is charged by means of a 24 volt battery. The potential difference between the plates of the $6\mu F$ capacitor is: **[4]**

   a) 8 volt b) 6 volt

   c) 10 volt d) 4 volt

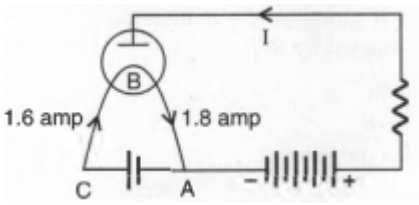
6. The equivalent resistance between A and B (of the circuit shown) is: **[4]**



   a) 20 Ω b) 4.5 Ω

   c) 5.4 Ω d) 12 Ω

7. The current in the heater circuit of the diode valve is 1.6 amp in section CB and 1.8 amp in section BA as shown in the following figure. Then, the plate current l is: **[4]**



a) 0.1 amp
b) 1.7 amp
c) 0.4 amp
d) 0.2 amp

8. A potential difference V is applied to a conductor of length l and radius r. When l is doubled without changing the potential difference, then the drift velocity is: **[4]**

a) unchanged
b) halved
c) quadrupled
d) doubled

9. Two identical cells connected in series send 10 amp current through a 5 Ω resistor. When they are connected in parallel, they send 8 amp current through the same resistance. What is the internal resistance of each cell? **[4]**

a) Zero
b) 10 Ω
c) 1.0 Ω
d) 2.5 Ω

10. Two wires of same metal have same length but their cross-sections are in the ratio 3 :1. They are joined in series. The resistance of the thicker wire is 10 Ω. The total resistance of the combination will be: **[4]**

a) 40Ω
b) 100Ω
c) $(\frac{5}{2})$ Ω
d) $(\frac{40}{3})$ Ω

11. The magnetic field B_0 due to a current-carrying circular loop of radius 12 cm at its centre is 0.50×10^{-4} T. The magnetic field due to this loop at a point on the axis at a distance of 5 cm from the centre is: **[4]**

a) 9.3×10^{-5} T
b) 3.9×10^{-5} T
c) 3.5×10^{-9} T
d) 5.3×10^{-9} T

12. The ratio of the magnetic field and magnetic moment at the centre of a current carrying circular loop is x. When both the current and radius is doubled, the ratio will be: **[4]**

a) $\frac{x}{2}$
b) $\frac{x}{4}$
c) $\frac{x}{8}$
d) 2x

13. The magnetic induction at a point on the axis of a magnet is proportional to: **[4]**

a) r^{-3}
b) r
c) r^{-2}
d) r^3

14. A certain amount of current when flowing in a properly set tangent galvanometer produces a deflection of 45°. If the current be reduced by a factor of $\sqrt{3}$, the deflection would: **[4]**

a) increase by 15°
b) decrease by 15°
c) decrease by 30°
d) increase by 30°

15. An electric motor has a back emf of 110 volt and armature current of 90 amp. The armature is making 2.5 rps. Then, the power developed is: **[4]**

a) 110 × 90watt

b) 110 × 25 watt

c) 90 × 25 watt

d) 90 × 27c × 25 watt

16. A horizontal straight conductor, when placed along south-north direction, falls under gravity; there is: **[4]**

i. an induced current from south to north direction

ii. an induced current from north to south direction

iii. no induced emf along the length of the conductor

iv. an induced emf along the length of the conductor

a) ii and iii

b) i and ii

c) only iii

d) iv and i

17. An AC supply of 100 volt maximum is applied to a capacitor of capacitance 20 μF. If the current in the circuit is 0.628 amp, the frequency of AC must be: **[4]**

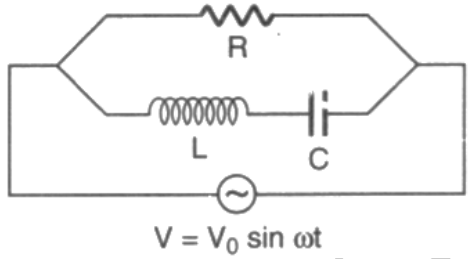
a) 40 Hz

b) 25 Hz

c) 60 Hz

d) 50 Hz

18. The current in resistance R at resonance is: **[4]**



a) minimum but finite

b) infinite

c) maximum but finite

d) zero

19. An alternating current of frequency f is flowing in a circuit containing only a choke coil L. If V_0 and I_0 represent peak values of the voltage and the current respectively, the average power given by the source to the choke is equal to: **[4]**

a) $\frac{1}{2}$ V_0 I_0

b) $\frac{1}{2}$ V_0 $(2\pi fL)$

c) 0

d) $\frac{1}{2}I_0^2$ $(2\pi fL)$

20. An electromagnetic wave going through vacuum is described by $E = E_0 \sin(kx - \omega t)$; $B = B_0 \sin(kx - \omega t)$. Which of the following equations is true? **[4]**

a) $E_0B_0 \neq \omega k$

b) $E_0k = B_0\omega$

c) $E_0B_0 = \omega k$

d) $E_0\omega = B_0k$

21. The electric field of a plane electromagnetic wave varies with time of amplitude $2Vm^{-1}$ propagating along the z-axis. The average energy density of the magnetic field is (in J m^{-3}): **[4]**

a) 13.29×10^{-12}

b) 17.72×10^{-12}

c) 8.86×10^{-12}

d) 4.43×10^{-12}

22. An electromagnetic wave radiates outwards from a dipole antenna, with E_0 as the amplitude of its electric field vector. The electric field E_0 which transports significant energy from the source, falls off as: **[4]**

a) $\frac{1}{r^3}$ b) $\frac{1}{r}$

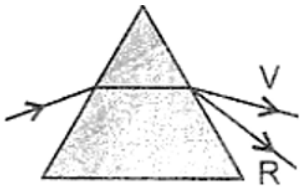
c) $\frac{1}{r^2}$ d) Remains constant

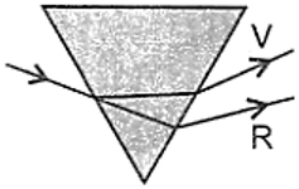
23. A person uses a lens of power +3 D to normalise vision. Near point of hypermetropic eye is: **[4]**

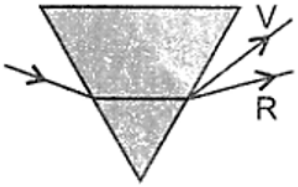
a) 0.66 m b) 1 m

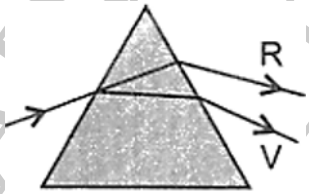
c) 1.66 m d) 2 m

24. Which of the following diagrams shows correctly the dispersion of white light by a prism? **[4]**

a) 

b) 

c) 

d) 

25. In Young's double-slit experiment, the source S and two slits A and B are horizontal with slit A above slit B. The fringes are observed on a vertical screen K. The optical path length from S to B is increased very slightly (by introducing a transparent material of higher refractive index) and the optical path length from S to A is not changed. As a result, the fringe: system on K moves: **[4]**

a) vertically upwards slightly b) vertically downwards slightly

c) horizontally, slightly to the left d) horizontally, slightly to the right

26. In Young's double-slit experiment the intensities, at two points P_1 and P_2 on the screen, are respectively I_1 and I_2. If P_1 is located at the centre of a bright fringe and P_2 is located at a distance equal to a quarter of fringe width from P_1, then $\frac{I_1}{I_2}$ is: **[4]**

a) 16 : 1 b) 4 : 1

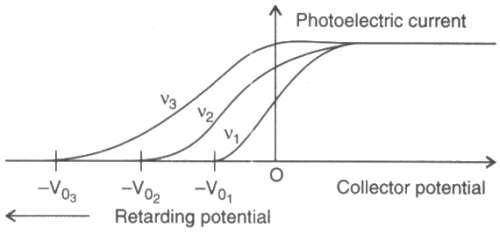
c) 1 : 2 d) 2 : 1

27. For which one of the following, Bohr model is not valid? **[4]**

a) Singly ionized helium atom (He^+) b) Hydrogen atom

c) Singly ionized neon atom (Ne^+) d) Deuteron atom

28. Variation of photoelectric current with collector plate potential for different frequencies of incident radiation is shown in the graph. Then: **[4]**



a) $v_3 > v_2 > v_1$ b) $v_2 = v_3 > v_1$

c) $v_1 = v_2 > v_3$ d) $v_1 > v_2 > v_3$

29. The momentum of a photon having energy E is: **[4]**

a) $\frac{E}{h}$ b) zero

c) $\frac{E}{c}$ d) $\frac{E}{c^2}$

30. The difference in the frequencies of a series limit of Lyman series and Balmer series is equal to the frequency of the first line of the: **[4]**

a) Paschen series b) Brackett series

c) Balmer series d) Lyman series

31. The electron in a hydrogen atom makes a transition from $n = n_1$ to $n = n_2$ state. The time period of the electron in the initial state (n_1) is eight times that in the final state (n_2). The possible values of n_1 and n_2 are: **[4]**

a) $n_1 = 2, n_2 = 4$ b) $n_1 = 8, n_2 = 1$

c) $n_1 = 1, n_2 = 8$ d) $n_1 = 4, n_2 = 2$

32. M_X and M_Y denote the atomic masses of the parent and the daughter nuclei, respectively in a radioactive decay. The Q value for a β^- decay is Q_1 and that for a β^+ decay is Q_2. If m_e denotes the mass of an electron, then which of the following statements is correct? **[4]**

a) $Q_1 = (M_X - M_Y)c^2$ and $Q_2 = (M_X - M_Y - 2m_e)c^2$

b) $Q_1 = (M_X - M_Y + 2m_e)c^2$ and $Q_2 = (M_X - M_Y + 2m_e)c^2$

c) $Q_1 = (M_X - M_Y)c^2$ and $Q_2 = (M_X - M_Y)c^2$

d) $Q_1 = (M_X - M_Y - 2m_e)c^2$ and $Q_2 = (M_X - M_Y + 2m_e)c^2$

33. When uranium ($_{92}U^{238}$) decays to lead ($_{82}Pb^{206}$), the number of alpha particles and beta panicles emitted are: **[4]**

a) 8 and 8 respectively b) 6 and 6 respectively

c) 8 and 6 respectively d) 6 and 8 respectively

34. In common base mode of a transistor, the collector current is 5.488 mA, for an emitter current of 5.60 mA. The value of the base current amplification factor (β) will be: **[4]**

a) 49 b) 50

c) 51 d) 48

35. The velocity of falling rain drops attains a limiting value, because of: **[4]**

a) surface tension of water b) viscosity of air

c) air current in atmosphere d) upthrust of air

Section B

36. **Assertion (A):** Electrostatic field lines start at positive charges and end at negative charges. **[4]**
Reason (R): Field lines are continuous curves without any breaks and they form closed loop.

a) Both A and R are true and R is the correct b) Both A and R are true but R is not the

explanation of A.

correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

37. **Assertion:** Capacitor is filled with same thickness of dielectric (t < d) and conducting sheet one after another, then capacitance are C_1 and C_2 respectively then $C_2 > C_1$. **[4]**

Reason: Capacitance is more in presence of metal sheet as $K_{metal} > K_{dielectric}$.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

38. **Assertion (A):** Kirchoff's junction rule follows from conservation of charge. **[4]**

Reason (R): Kirchoff's loop rule follows from conservation of momentum.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

39. **Assertion:** As the drift velocity increases, the current flowing through the conductor decreases. **[4]**

Reason: The current flowing through a conductor is directly proportional to drift velocity.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

40. **Assertion (A):** Basic difference between an electric line and magnetic line of force is that former is discontinuous and the later is continuous or endless. **[4]**

Reason (R): No electric lines of force exist inside a charged body but magnetic lines do exist inside a magnet.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

41. **Assertion:** The poles of magnets cannot be seperated by breaking it into two pieces. **[4]**

Reason: The magnetic moment will be reduced to half when a magnet is broken into two equal pieces.

a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

c) Assertion is correct statement but reason is wrong statement.

d) Assertion is wrong statement but reason is correct statement.

42. **Assertion (A):** An emf can be induced by moving a conductor in a magnetic field. **[4]**

Reason (R): An emf can be induced by changing the magnetic field.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

43. **Assertion (A):** 220 V, 50 Hz appliance implies that emf across the appliance should be 220 V. **[4]**
Reason (R): Every appliance is specified with its peak Tolerable voltage.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

44. **Assertion (A):** The velocity of electromagnetic waves depends on electric and magnetic properties of the medium. **[4]**
Reason (R): Velocity of electromagnetic waves in free space is constant.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

45. **Assertion (A):** Diamond glitters brilliantly. **[4]**
Reason (R): Diamond reflects sunlight strongly.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

46. **Assertion (A):** For identical coherent waves, the maximum intensity is four times the intensity due to each wave **[4]**
Reason (R): Intensity is proportional to the square of amplitude.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

47. **Assertion (A):** The phase difference between any two points on a wavefront is zero. **[4]**
Reason (R): All points on a wavefront are at the same distance from the source and thus oscillate in the same phase.

a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

b) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the Assertion (A).

c) Assertion (A) is true, but Reason (R) is false.

d) Assertion (A) is false and Reason (R) is also false.

48. **Assertion (A):** An electron and a photon possessing same wavelength, will have the same momentum. **[4]**
Reason (R): Electron and photon possess same energy.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

49. **Assertion (A):** Fraunhofer lines are observed in the spectrum of the sun. **[4]**

Reason (R): The different elements have different spectra.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

50. **Assertion (A):** Unlike electric forces and gravitational forces, nuclear force has limited range. **[4]**

Reason (R): Nuclear force do not obey inverse square law.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.